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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

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ıternational Application No. **CT/NZ2003/000239**	International Filing Date *(day/month/year)* 22 October 2003	Priority Date *(day/month/year)* 22 October 2002

ıternational Patent Classification (IPC) or national classification and IPC

ıt. Cl.[7] B60P 1/18, 3/07, 3/12; B62D 33/077

.pplicant

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. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

. This REPORT consists of a total of 3 sheets, including this cover sheet.

[X] This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of **8** sheet(s).

3. This report contains indications relating to the following items:

- I [X] Basis of the report
- II [ ] Priority
- III [ ] Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV [ ] Lack of unity of invention
- V [X] Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI [ ] Certain documents cited
- VII [ ] Certain defects in the international application
- VIII [ ] Certain observations on the international application

Date of submission of the demand 5 April 2004	Date of completion of the report 20 August 2004
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer **L. DESECAR** Telephone No. (02) 6283 2381

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/NZ2003/000239

I. Basis of the report

1. With regard to the **elements** of the international application:*

☐ the international application as originally filed.

☒ the description, pages **1, 4, 7-13**, as originally filed,
pages , filed with the demand,
pages **2-3, 5-6,** received on **17 August 2004** with the letter of **17 August 2004**

☒ the claims, pages , as originally filed,
pages , as amended (together with any statement) under Article 19,
pages , filed with the demand,
pages **14-17** received on **17 August 2004** with the letter of **17 August 2004**

☒ the drawings, pages **1/14-14/14** as originally filed,
pages , filed with the demand,
pages , received on with the letter of

☐ the sequence listing part of the description:
pages , as originally filed
pages , filed with the demand
pages , received on with the letter of

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages

☐ the claims, Nos.

☐ the drawings, sheets/fig.

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report*

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims **1-20**	**YES**
	Claims	**NO**
Inventive step (IS)	Claims **1-20**	**YES**
	Claims	**NO**
Industrial applicability (IA)	Claims **1-20**	**YES**
	Claims	**NO**

2. Citations and explanations (Rule 70.7)

Claims 1-20 meet the criteria set out in the PCT Article 3(2)-(4), because none of the prior art documents teaches or fairly suggests a truck including a chassis supporting a cab and a deck which is supported at least partly by a rearmost axle and wheels by a suspension arrangement, with a forward part of the suspension arrangement operatively connected to the chassis and a rear part of the suspension arrangement operatively connected to the deck or a deck support frame, wherein the deck is tiltable relative to the chassis about a pivot axis located in front of the rearmost axle of the truck and arranged such that as the deck tilts rearwardly, the chassis tilts forwardly and the forward part of the suspension arrangement moves upwardly relative to the deck, thereby lowering the deck towards the rearmost axle.

US 4,318,658 describes a truck with a split chassis such that the cab tilts forwardly as the deck tilts rearwardly. Whilst the truck provides a shallower deck angle than a conventional tilting deck with a rear pivot, the deck angle is still steeper than is desirable. Further, due to the stoppers hanging below the rear end of the deck, as the deck is tilted to the rearmost position, the stoppers will raise the deck off the ground.

US 5,234,308 describes a trailer having a split bed which is hinged between its two axles. Whilst the rear end of the bed tilts towards the ground, in the tilted configuration there is a peak provided between the front and rear parts of the bed, which could cause a vehicle to "bottom out" on the peak during loading or unloading.

US 5,051,053 and US 4,730,974 describe load carrying trailers which provide shallow loading angles. That can be achieved in trailers by having the deck in a low and/or permanently-angled position between the wheels. However, such a configuration is generally not applicable to trucks, as they require greater strength and rigidity, as well as requiring additional room to accommodate the drive system including the drive shaft and differential.

Other load carrying vehicles are described in US 4,929,142; US 4,750,856; and US 5,051,053.

It is an object of at least preferred embodiments of the present invention to provide a truck which ameliorates at least one of the disadvantages outlined above and/or which at least provides the public with a useful choice.

Summary of the Invention

In accordance with a first aspect of the invention, there is provided a truck including: a chassis supporting a cab; and a deck which is supported at least partly by a rearmost axle and wheels by a suspension arrangement, with a forward part of the suspension arrangement operatively connected to the chassis and a rear part of the suspension

arrangement operatively connected to the deck or a deck support frame, wherein the deck is tiltable relative to the chassis about a pivot axis located in front of the rearmost axle of the truck and arranged such that as the deck tilts rearwardly, the chassis tilts forwardly and said forward part of the suspension arrangement moves upwardly relative to the deck, thereby lowering the deck towards the rearmost axle.

The chassis advantageously terminates forwardly of the rearmost axle.

The deck may be supported by a deck support frame which is pivotally connected to the chassis at the pivot axis. Alternatively, the deck may be pivotally connected to the chassis at the pivot axis.

The chassis suitably includes a pair of transversely extending arms which are pivotally connected to the deck or deck support frame to provide the pivoting connection between the deck and the chassis. The outwardly extending arms may be part of a chassis subframe member which forms a rearward part of the chassis.

In one embodiment, the suspension arrangement may comprise leaf spring suspension. The leaf spring suspension may include a pair of spaced apart leaf springs, with the rear ends of the leaf springs operatively connected to the deck or deck support frame, and the front ends of the leaf springs operatively connected to the chassis, so that as the deck tilts the front ends of the leaf springs move upwardly relative to the deck, thereby lowering the deck towards the axle. The chassis preferably includes a pair of spring connectors for attachment to the front ends of respective leaf springs. The spring connectors are suitably carried by a chassis subframe member which forms a rearward part of the chassis.

In accordance with a second aspect of the invention, there is provided a truck including: a chassis supporting a cab; and a deck which is supported at least partly by a rearmost axle and wheels by a suspension arrangement, with a forward part of the suspension arrangement operatively connected to the chassis and a rear part of the suspension arrangement operatively connected to the deck or a deck support frame, wherein the deck is tiltable relative to the chassis about a pivot axis located in front of the rearmost axle of the truck and in front of said forward part of the suspension arrangement and arranged such that as the deck tilts rearwardly, the chassis tilts forwardly and said forward part of the suspension arrangement moves upwardly relative to the deck, thereby lowering the deck towards the rearmost axle.

Brief Description of the Drawings

Preferred embodiments of the invention will be described, by way of example only, with reference to the accompanying figures in which:

Figure 1 is a perspective view of a preferred embodiment truck, having a deck upon which a vehicle is positioned for transportation;

Figure 2 is a rear perspective view of the truck of Figure 1, with the deck in a tilted position for loading or unloading of the vehicle onto or off the truck deck;

Figure 3 is a view of the truck of Figure 1 with the deck removed, in a transportation configuration;

Figure 4 is a view similar to Figure 3, showing the truck in a loading/unloading configuration;

Figure 5a, 5b and 5c show a plan, side elevation, and rear sectional view respectively of a chassis subframe member;

Figure 6 shows the interaction between the chassis subframe member and a suspension leaf spring when the truck is in the transportation configuration;

Figure 7 shows the interaction between the chassis subframe member and a suspension leaf spring when the truck is in an intermediate configuration between the transportation configuration and loading/unloading configuration;

Figure 8 the interaction between the chassis subframe member and a suspension leaf spring when the truck is in the loading/unloading configuration;

Figure 9 is an overhead perspective view of a preferred embodiment deck when the truck is in the loading/unloading configuration;

Figure 10 is a schematic side elevation view of an alternative preferred embodiment truck;

Figure 11 is an exploded side elevation view of the main components of the truck of Figure 10;

Figures 12a, 12b and 12c schematically show the truck of Figure 10 in a loading/unloading, intermediate, and transportation configuration respectively;

Figure 13 schematically shows a truck similar to that of Figure 10, but including air bags at the rear end of the leaf springs; and

Figure 14 is a view of a portion of one side of the truck deck showing looped chains positioned on the deck for securement of vehicles to the deck

Detailed Description of Preferred Forms

WHAT I CLAIM IS:

1. A truck including: a chassis supporting a cab; and a deck which is supported at least by a rearmost axle and wheels; wherein the deck is tiltable relative to the chassis about a pivot axis located in front of the rearmost axle of the truck and arranged such that as the deck tilts rearwardly, the chassis tilts forwardly and the deck lowers towards the rearmost axle.

2. A truck as claimed in claim 1, wherein the chassis terminates forwardly of the rearmost axle.

3. A truck as claimed in claim 1 or 2, wherein the deck is supported by a deck support frame which is pivotally connected to the chassis at the pivot axis.

4. A truck as claimed in claim 1 or 2, wherein the deck is pivotally connected to the chassis at the pivot axis.

5. A truck as claimed in any one of the preceding claims, wherein the chassis includes a pair of transversely extending arms which are pivotally connected to the deck or deck support frame to provide the pivoting connection between the deck and the chassis.

6. A truck as claimed in claim 5, wherein the outwardly extending arms are part of a chassis subframe member which forms a rearward part of the chassis.

7. A truck as claimed in any one of the preceding claims, wherein the deck is supported on the rearmost axle by a suspension arrangement and a forward part of the suspension arrangement is operatively connected to the chassis, such that as the deck tilts the forward part of the suspension arrangement moves upwardly relative to the deck, thereby lowering the deck towards the rearmost axle.

8. A truck as claimed in claim 7, wherein said pivot axis is positioned forwardly of said forward part of the suspension arrangement.

9. A truck as claimed in claim 7 or 8, wherein the suspension arrangement comprises leaf spring suspension.

10. A truck as claimed in claim 9, wherein the leaf spring suspension includes a pair of spaced apart leaf springs, with the rear ends of the leaf springs operatively connected to the deck or deck support frame, and the front ends of the leaf springs operatively connected to the chassis, so that as the deck tilts the front ends of the leaf springs move upwardly relative to the deck, thereby lowering the deck towards the axle.

11. A truck as claimed in claim 10, wherein the chassis includes a pair of spring connectors for attachment to the front ends of respective leaf springs.

12. A truck as claimed in claim 11, wherein the spring connectors are carried by a chassis subframe member which forms a rearward part of the chassis.

13. A truck as claimed in any one of claims 10 to 12, wherein the deck includes a pair of apertures, shaped recesses or moveable covers which enable the front ends of the leaf springs and/or the spring connectors to extend above a lower part of the deck when the deck is tilted.

14. A truck as claimed in claim 7 or 8, wherein the suspension arrangement includes a pair of spaced apart leaf springs, with the front ends of the leaf springs operatively connected to the chassis, and the rear ends of the leaf springs operatively connected to the deck or deck support frame via respective air bags configured to enable air to be expelled as the deck is tilted, thereby further lowering the deck towards the rearmost axle.

15. A truck as claimed in any one of the preceding claims, wherein the deck includes a pair of apertures, shaped recesses or moveable covers which enable upper edges of the wheels to extend above a lower part of the deck when the deck is tilted.

16. A truck as claimed in any one of the preceding claims, including an engine supported by the chassis, a driveshaft to transmit motive power from the engine and which extends rearwardly from the engine, and a differential to transmit motion from the driveshaft to the wheels carried by the rearmost axle, wherein the driveshaft includes a pivot to accommodate changes in angle between the driveshaft and differential as the deck is tilted.

17. A truck as claimed in any one of the preceding claims, wherein the truck includes a ramp at or towards the rear end of the deck and which is moveable from a storage position to a loading/unloading position to enable ease of loading and unloading of vehicles or goods onto and off the deck.

18. A truck as claimed in claim 17, wherein the ramp is configured to automatically move to the loading/unloading position as the deck it tilted, and to automatically move to the storage position as the deck is returned from a tilted position.

19. A truck as claimed in claim 17 or 18, wherein the ramp is pivotally connected to the deck or deck support frame.

20. A truck as claimed in claim 19, wherein the ramp is foldable across its width, and as configured to automatically fold in the storage position and unfold in the loading/unloading position.

21. A truck including: a chassis supporting a cab; and a deck which is supported on a rearmost axle and wheels by a suspension arrangement, with a forward part of the suspension arrangement operatively connected to the chassis and a rear part of the suspension arrangement operatively connected to the deck, wherein the deck is tiltable

relative to the chassis about a pivot axis located in front of the rearmost axle of the truck and in front of said forward part of the suspension arrangement and arranged such that as the deck tilts rearwardly, the chassis tilts forwardly and said forward part of the suspension arrangement moves upwardly relative to the deck, thereby lowering the deck towards the rearmost axle.